

SEQUENCE OF OPERATION

OCCUPIED MODE:
SUPPLY FAN: FAN SHALL RUN CONTINUOUSLY AND CYCLE BETWEEN LOW-MEDIUM-HIGH FAN SPEEDS. WHEN ROOM TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS, THE FAN SHALL RUN ON LOW SPEED. THE FAN SHALL STAGE UP WHEN ROOM TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT OR DROPS BELOW THE OCCUPIED HEATING SETPOINT.

COOLING: WHEN ROOM TEMPERATURE IS BELOW THE OCCUPIED COOLING SETPOINT, THE COOLING VALVE SHALL BE CLOSED. WHEN ROOM TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT, THE COOLING VALVE SHALL MODULATE OPEN.

HEATING: WHEN ROOM TEMPERATURE IS ABOVE THE OCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL BE CLOSED. WHEN ROOM TEMPERATURE DROPS BELOW THE OCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL MODULATE OPEN.

UNOCCUPIED MODE:
SUPPLY FAN: WHEN ROOM TEMPERATURE IS BETWEEN THE UNOCCUPIED HEATING AND COOLING SETPOINTS, THE FAN SHALL CYCLE OFF. THE FAN SHALL STAGE UP WHEN ROOM TEMPERATURE RISES ABOVE THE UNOCCUPIED COOLING SETPOINT OR DROPS BELOW THE HEATING SETPOINT.
COOLING: WHEN ROOM TEMPERATURE IS BELOW THE UNOCCUPIED COOLING SETPOINT, THE COOLING VALVE SHALL BE CLOSED. WHEN ROOM TEMPERATURE RISES ABOVE THE UNOCCUPIED COOLING SETPOINT, THE COOLING VALVE SHALL MODULATE OPEN.
HEATING: WHEN ROOM TEMPERATURE IS ABOVE THE UNOCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL BE CLOSED. WHEN ROOM TEMPERATURE DROPS BELOW THE UNOCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL MODULATE OPEN.

NOTE: PROVIDE SIMILAR CONTROL SEQUENCE FOR UNITS WITH ELECTRIC HEAT

FAN COIL UNIT

NOT TO SCALE

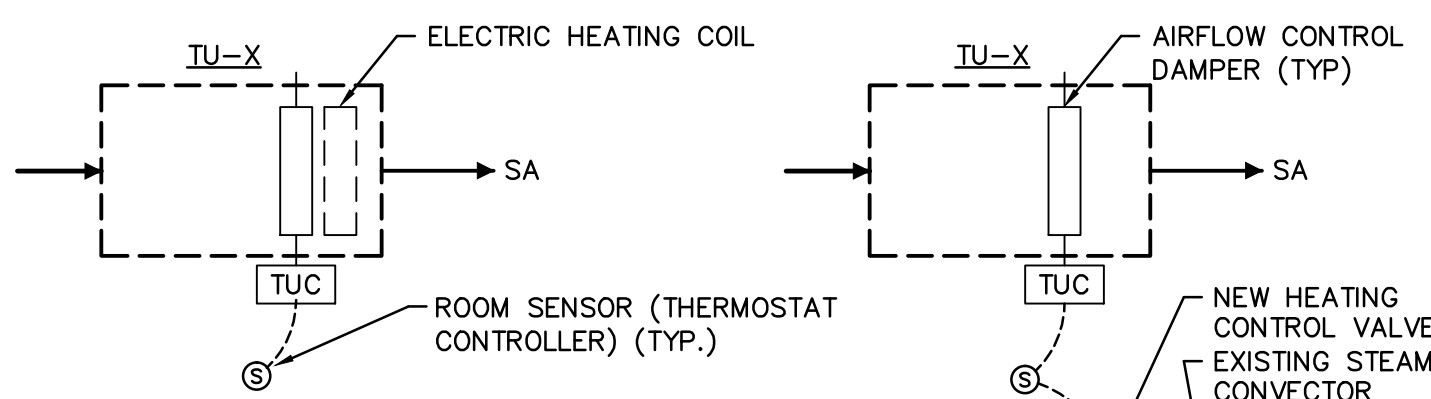
SEQUENCE OF OPERATION

OCCUPIED MODE: FAN SHALL RUN CONTINUOUSLY.

UNOCCUPIED MODE: FAN SHALL CYCLE ON FOR 10 MINUTES EVERY HOUR.

EXHAUST FAN

NOT TO SCALE



SEQUENCE OF OPERATION

EXISTING AHU SUPPLY FAN: COORDINATE AND INTERFACE ALL TERMINAL UNIT CONTROLS WITH EXISTING AHU SUPPLY FAN AND COOLING COIL OPERATION AND CONTROLS.

OCCUPIED MODE:
COOLING: WHEN ROOM TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT, THE TERMINAL UNIT CONTROLLER (TUC) SHALL POSITION THE AIRFLOW CONTROL DAMPER AS REQUIRED TO MAINTAIN THE OCCUPIED COOLING SETPOINT. WHEN ROOM TEMPERATURE IS BELOW THE OCCUPIED COOLING SETPOINT, THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION.
HEATING (ELECTRIC HEATING COIL): WHEN ROOM TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT, THE ELECTRIC HEATING COIL SHALL STAGE ON AND THE TUC SHALL MODULATE THE AIRFLOW CONTROL DAMPER BETWEEN THE MINIMUM POSITION AND THE MAXIMUM HEATING AIRFLOW AS REQUIRED TO MAINTAIN THE OCCUPIED HEATING SETPOINT. WHEN ROOM TEMPERATURE IS ABOVE THE OCCUPIED HEATING SETPOINT, THE ELECTRIC HEATING COIL SHALL STAGE OFF AND THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION.
HEATING (STEAM CONVECTOR): WHEN ROOM TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL MODULATE OPEN AND TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION. WHEN ROOM TEMPERATURE IS ABOVE THE OCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL CLOSE AND THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION.

UNOCCUPIED MODE:
COOLING: WHEN ROOM TEMPERATURE RISES ABOVE THE UNOCCUPIED COOLING SETPOINT, THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AS REQUIRED TO MAINTAIN THE UNOCCUPIED COOLING SETPOINT.
HEATING (ELECTRIC HEATING COIL): WHEN ROOM TEMPERATURE FALLS BELOW THE UNOCCUPIED HEATING SETPOINT, THE ELECTRIC HEATING COIL SHALL STAGE ON TO MAINTAIN THE UNOCCUPIED HEATING SETPOINT AND THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION.
HEATING (STEAM CONVECTOR): WHEN ROOM TEMPERATURE FALLS BELOW THE UNOCCUPIED HEATING SETPOINT, THE HEATING VALVE SHALL MODULATE OPEN TO MAINTAIN THE UNOCCUPIED HEATING SETPOINT AND THE TUC SHALL POSITION THE AIRFLOW CONTROL DAMPER AT THE MINIMUM POSITION.

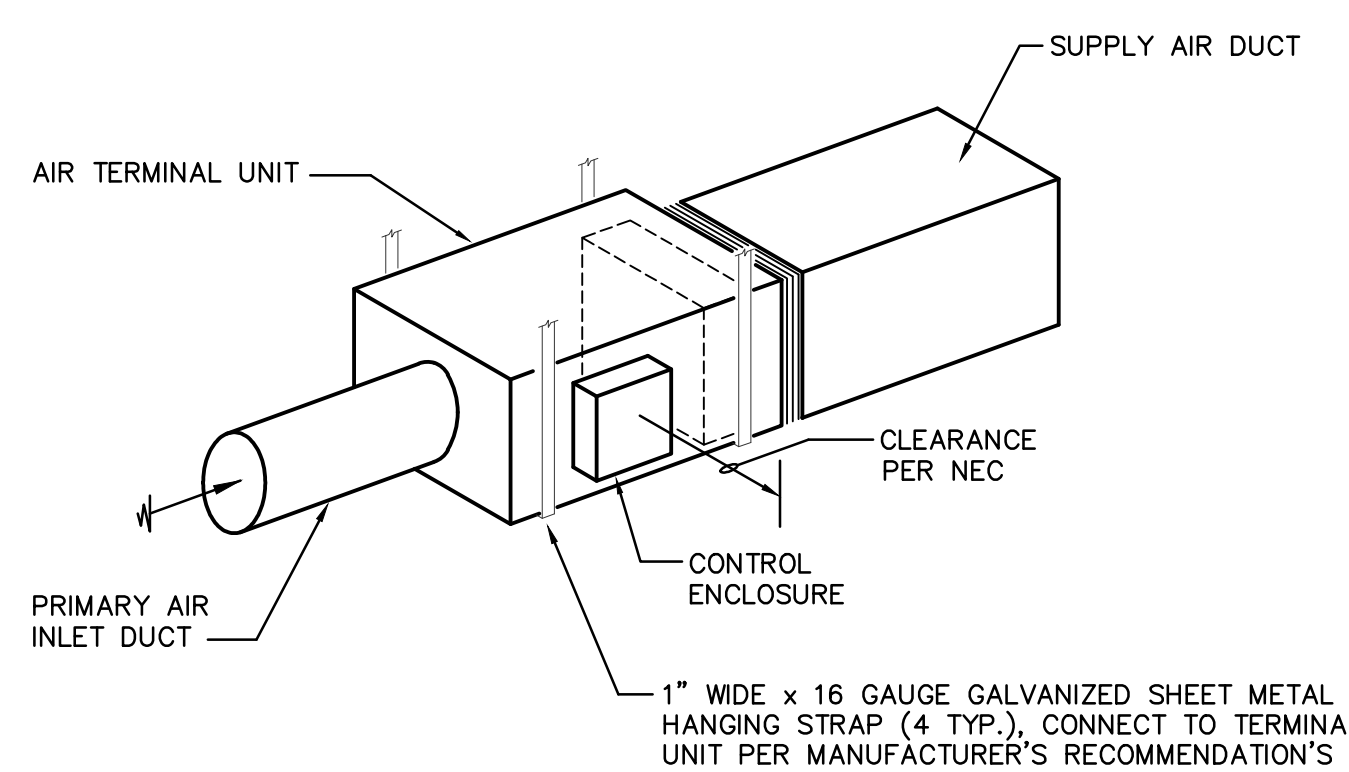
GENERAL TEMPERATURE CONTROL NOTE:
PROVIDE NEW JOHNSON CONTROLS NETWORK CONTROL MODULE (NCM) FOR CONTROL OF ALL NEW MECHANICAL EQUIPMENT. COORDINATE EXACT LOCATION OF NCM WITH CONTRACTOR.

VAV TERMINAL UNIT

NOT TO SCALE

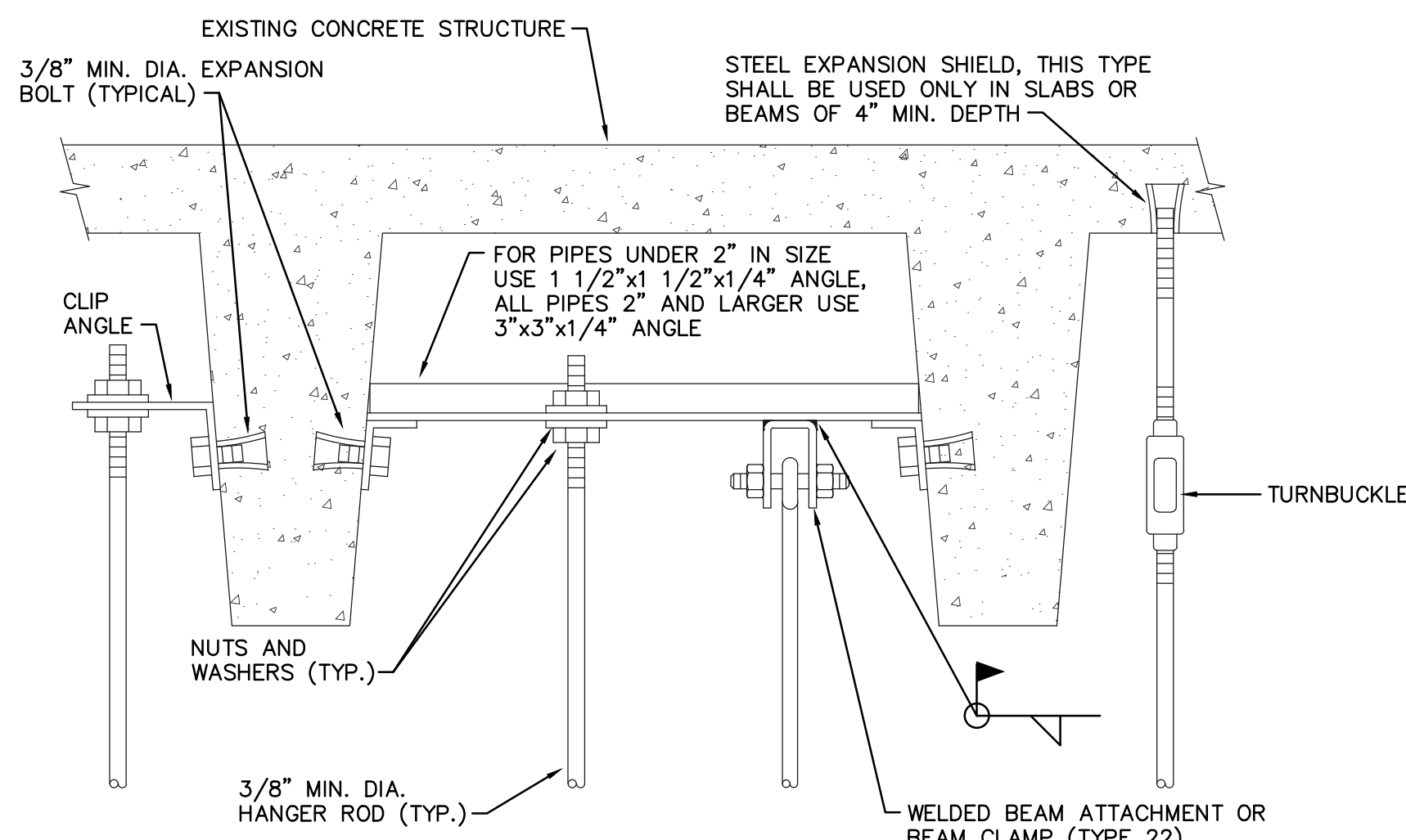
10 CONTROL DIAGRAMS

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11 SINGLE DUCT - AIR TERMINAL UNIT CONNECTION DETAIL

NOT TO SCALE

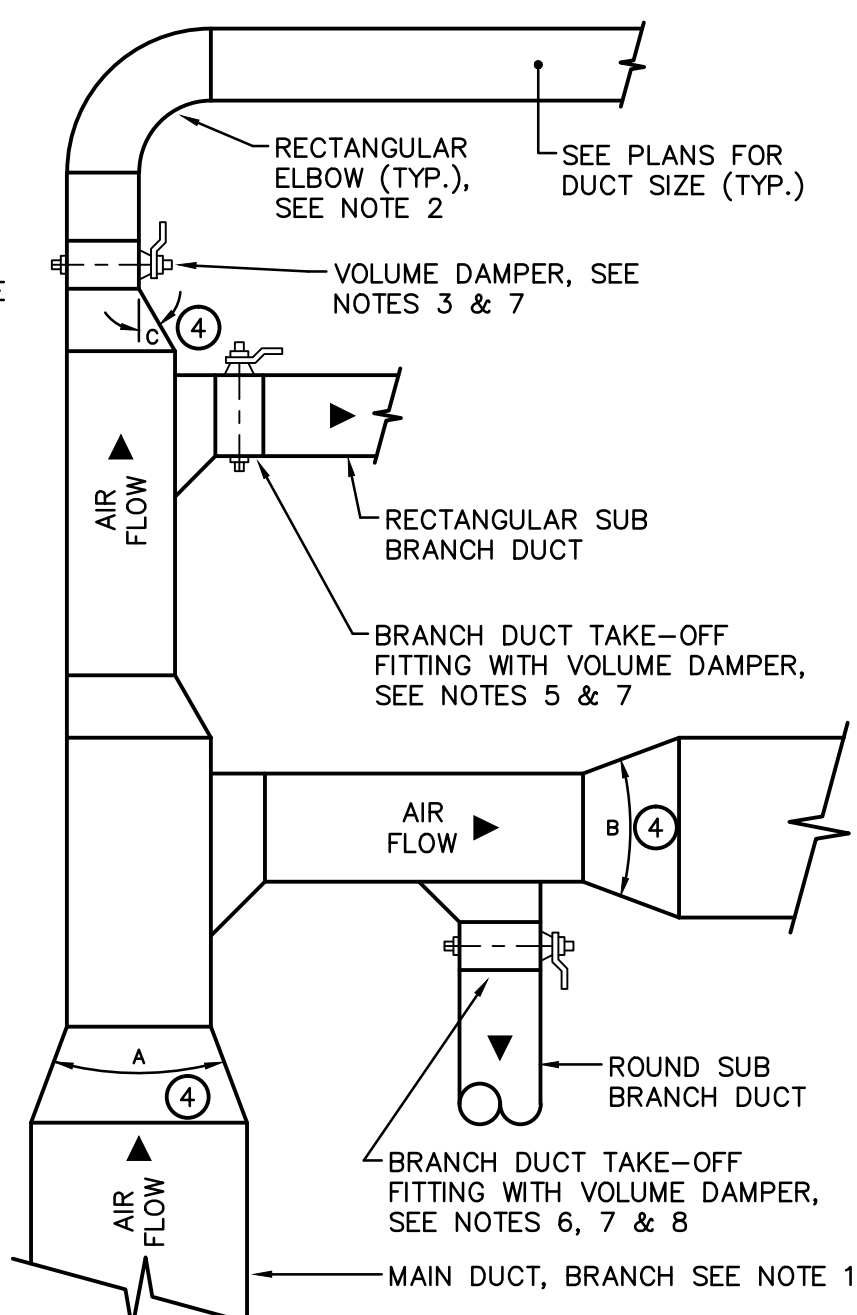


7 HANGER ROD SUPPORT DETAIL

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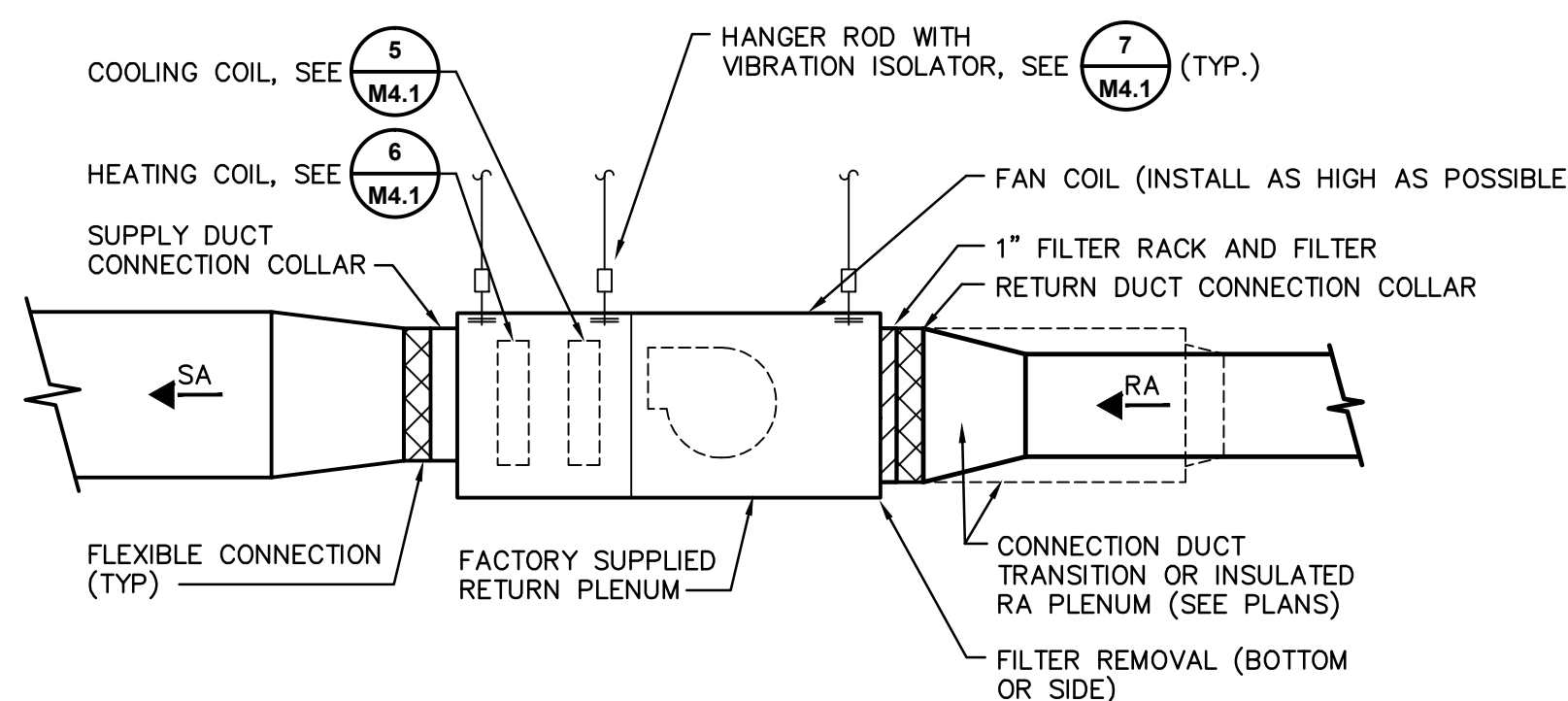
KEYNOTES

- LOW PRESSURE DUCTWORK SHALL INCLUDE SUPPLY AIR, VENTILATION AIR AND RETURN AIR DUCTWORK WITH PRESSURE CLASS OF 2-INCH WG OR LESS AND EXHAUST AIR DUCTWORK WITH PRESSURE CLASS OF 3-INCH WG OR LESS.
- ALL RECTANGULAR ELBOWS SHALL BE RADIUS TYPE EXCEPT WHERE SPACE RESTRICTIONS NECESSITATE USING 90 DEGREE SQUARE THROAT ELBOW WITH TURNING VANES. ELBOW RADIUS SHALL BE PER SMACNA RECOMMENDATIONS.
- VOLUME DAMPERS SHALL BE PROVIDED ON ALL LOW PRESSURE DUCT BRANCHES AND AS INDICATED ON PLANS AND AS REQUIRED BY SPECIFICATIONS.
- DUCTWORK TRANSITIONS:
 - CONCENTRIC, CONVERGING: 60 DEGREE ANGLE (MAX.)
 - CONCENTRIC, DIVERGING: 45 DEGREE ANGLE (MAX.)
 - ECCENTRIC, CONVERGING OR DIVERGING: 30 DEGREE ANGLE (MAX.)
- RECTANGULAR TO RECTANGULAR BRANCH DUCT TAKE-OFF FITTING SHALL BE FACTORY FABRICATED 45 DEGREE TAKE-OFF WITH SEALED JOINTS AND SEAMS OR PITTSBURGH LOCK LONGITUDINAL SEAMS.
- RECTANGULAR TO ROUND BRANCH DUCT TAKE-OFF FITTING SHALL BE FACTORY FABRICATED STRAIGHT-SIDED HIGH EFFICIENCY TAKE-OFF (HETO OR EQUAL) WITH SEALED JOINTS AND SEAMS AND GASKETED FLANGE.
- VOLUME DAMPERS ON DUCT SYSTEMS WITH INSULATION ON THE EXTERIOR OF THE DUCT SHALL BE PROVIDED WITH STAND-OFF BRACKET EQUAL TO OR GREATER THAN INSULATION THICKNESS.



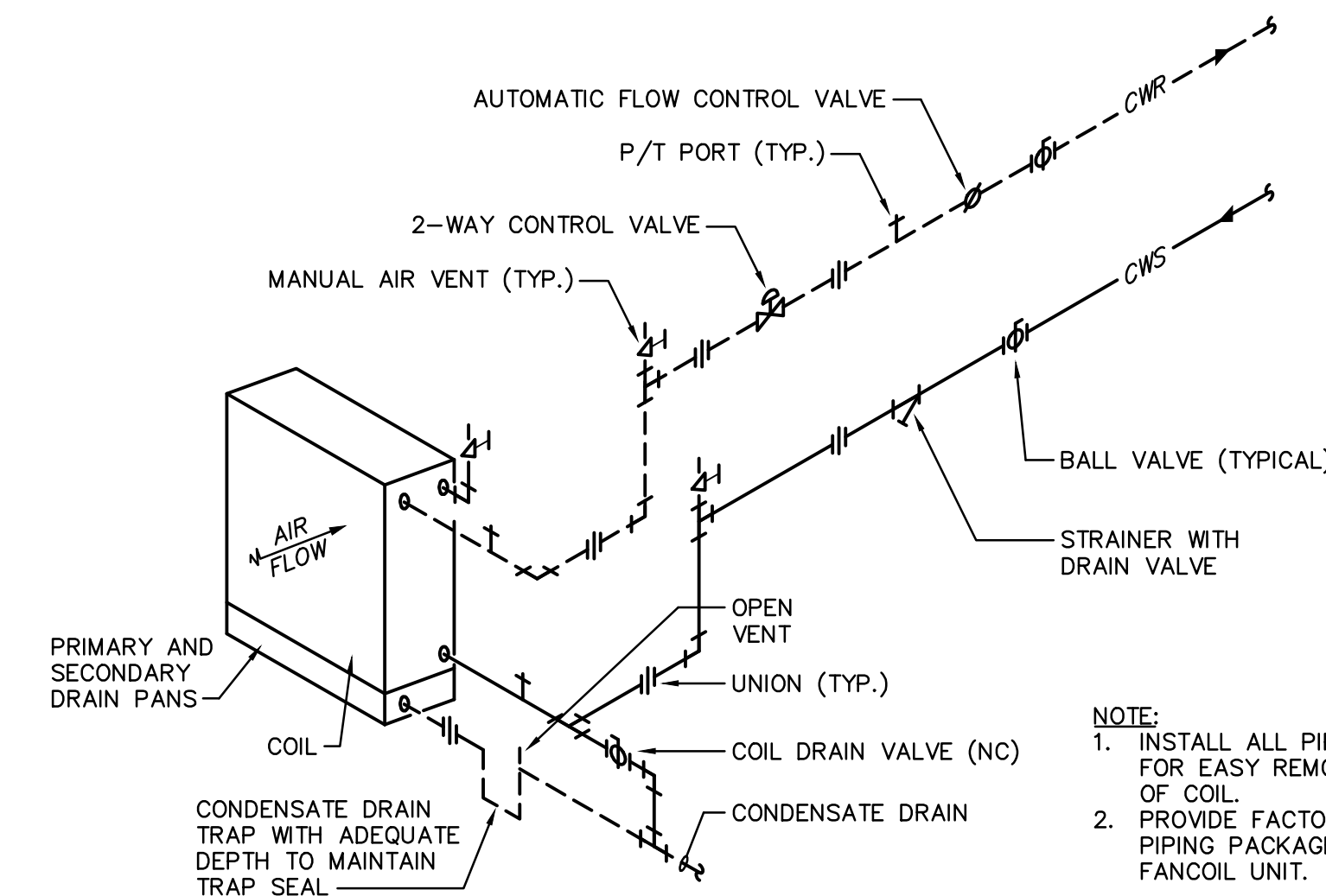
8 TYPICAL LOW PRESSURE DUCT DETAIL

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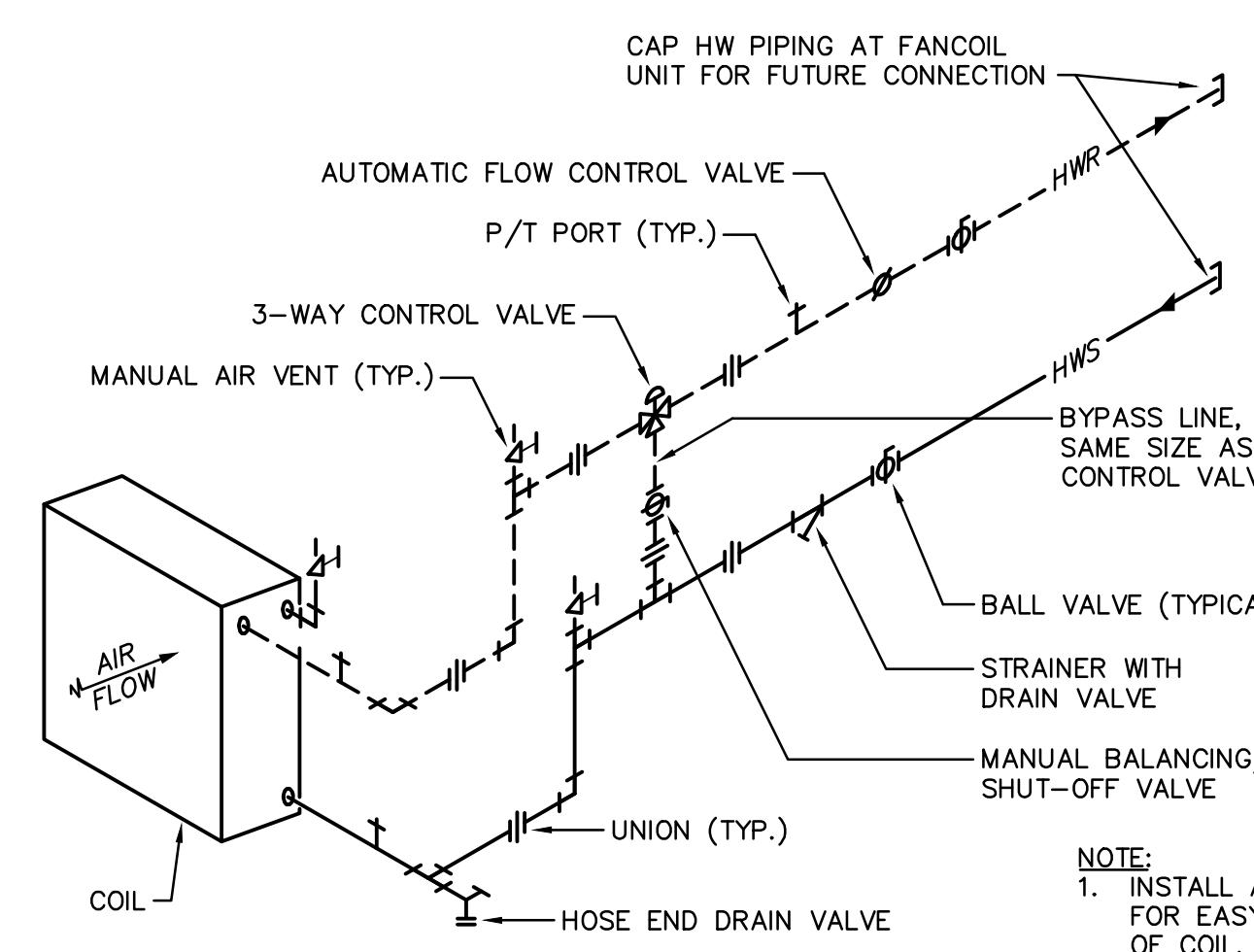
4 FAN COIL DUCTWORK DETAIL

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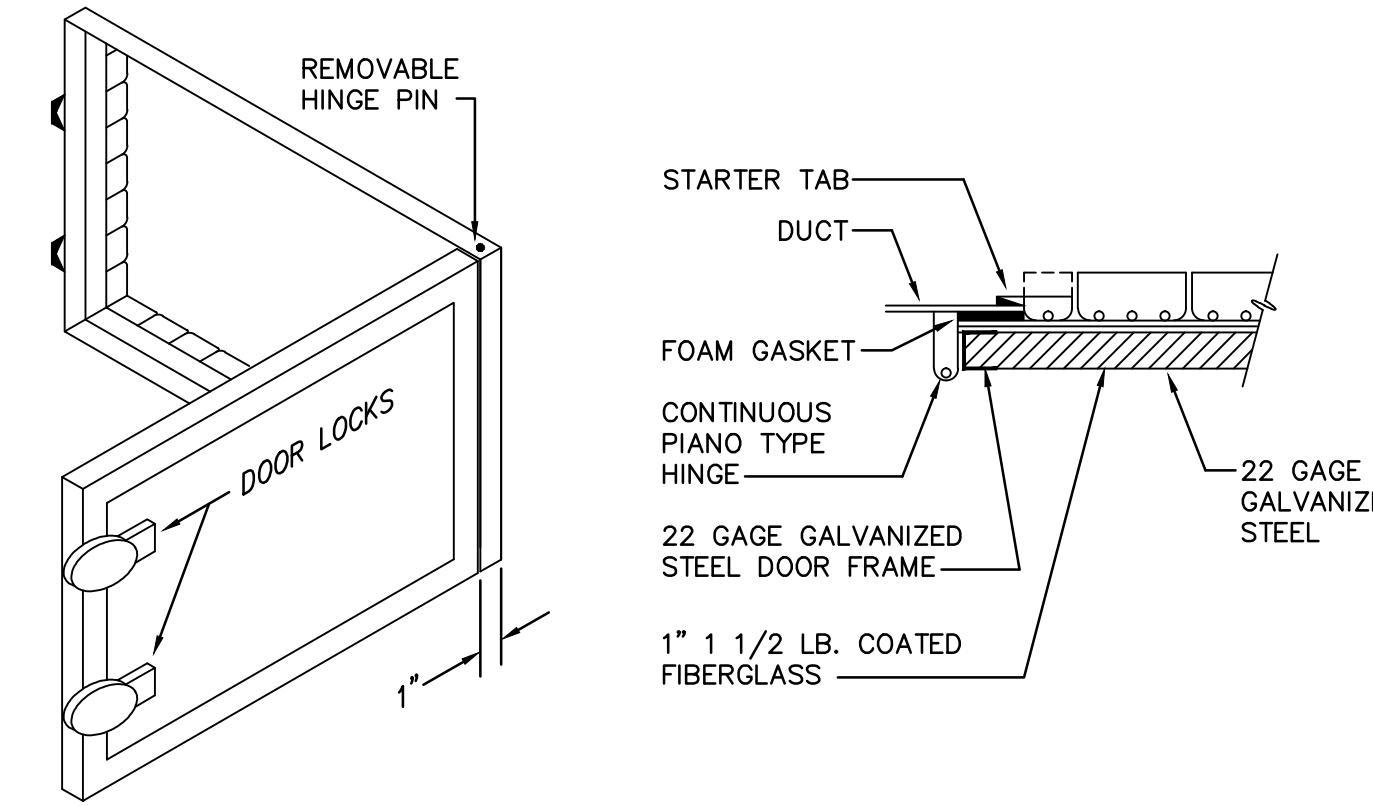
5 CHILLED WATER COOLING COIL PIPING DETAIL (2-WAY VALVE)

NOT TO SCALE



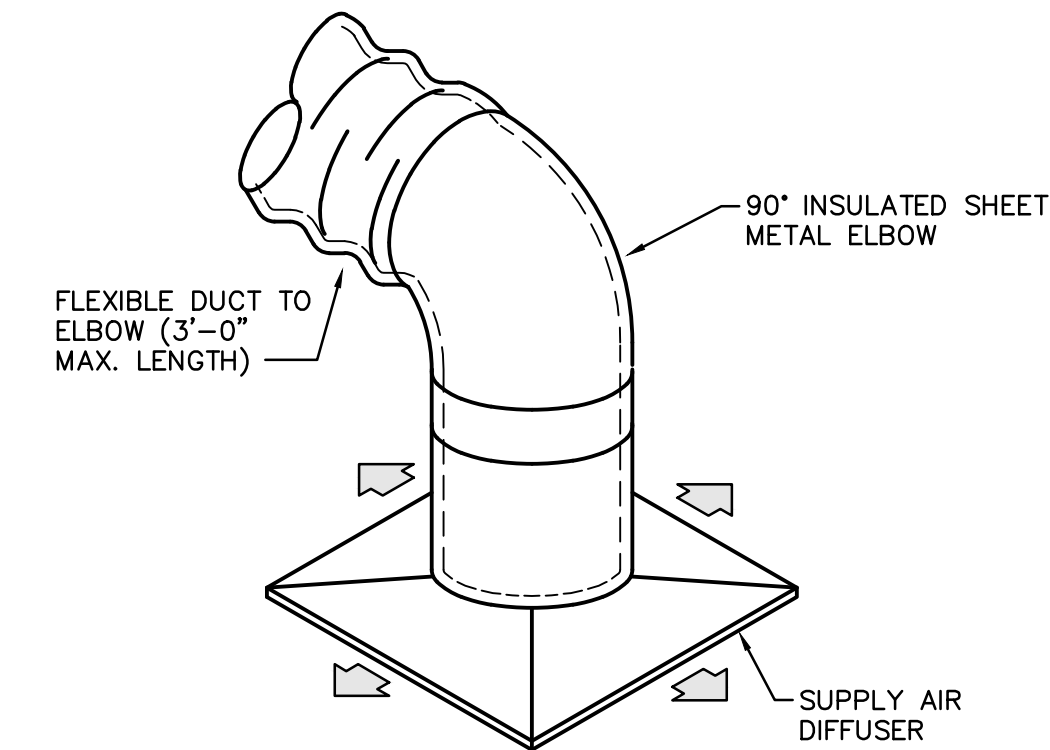
6 HOT WATER HEATING COIL PIPING DETAIL (3-WAY VALVE)

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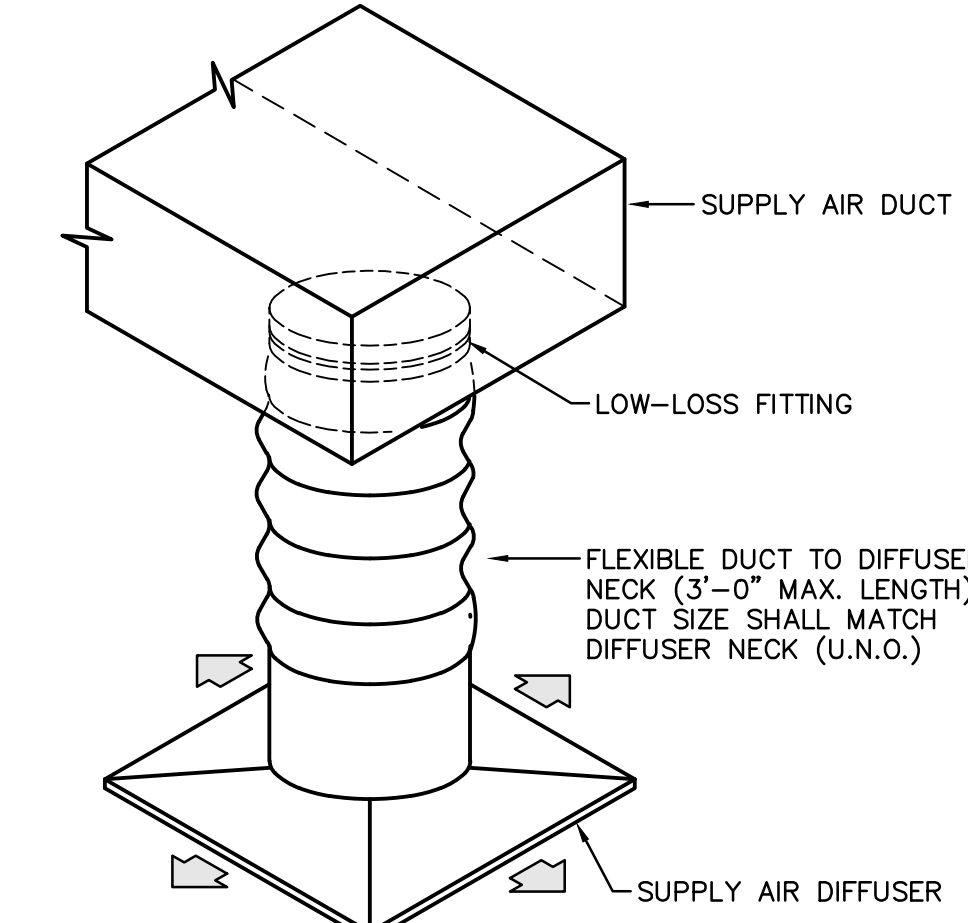
1 ACCESS DOOR DETAIL

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2 DIFFUSER CONNECTION DETAIL

NOT TO SCALE



3 DIFFUSER CONNECTION DETAIL

NOT TO SCALE

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